

What is claimed is:

1. A method for controlling the hypochlorite/hypochlorous acid balance of a control stream, the method comprising the steps of:

- (a) combining an acid with a first carrier stream to form a first mixed stream;
- 5 (b) introducing a chlorination agent into the control stream, the chlorination agent increasing the concentration of hypochlorous acid and hypochlorite of the control stream;
- (c) combining the first mixed stream with the control stream having the chlorination agent, thereby reducing the pH of the control stream and increasing the relative ratio of hypochlorous acid to hypochlorite of the control stream.

10 2. The method according to Claim 1, wherein the ratio of hypochlorous acid to hypochlorite in the control stream is greater than one.

3. The method according to Claim 1, wherein the control stream is about 77 to about 99 percent hypochlorous acid.

4. The method according to Claim 1, wherein after combining the first mixed stream with the control stream, the pH of the control stream is between approximately 4.3 and approximately 7.0.

5. The method according to Claim 1, wherein the first mixed stream is pressurized.

6. The method according to Claim 1, wherein the control stream with a chlorination agent is pressurized.

7. The method according to Claim 1, wherein the acid includes carbon dioxide.

8. The method according to Claim 1, wherein the first carrier stream is pressurized to at least about 50 psi.

9. The method according to Claim 1, wherein the chlorinating agent is selected from the group consisting of chlorine gas, a solid hypochlorite salt (e.g., NaOCl or Ca(OCl)₂), and a liquid hypochlorite solution.

10. The method according to Claim 7, wherein the acid is an organic acid selected from the group consisting of formic acid, acetic acid, citirc acid, lactic acid, trifluoroacetic acid, oxalic acid, tartaric acid, fumaric acid, maleic acid, methanesulfonic acid, benzenesulfonic acid and p-toluenesulfonic acid.

11. The system of Claim 8, wherein the acid is an inorganic acid selected from the group consisting of hydrochloric acid, hydrobromic acid, sulfuric acid, nitric acid and phosphoric acid.

12. A method for controlling the hypochlorite/hypochlorous acid balance of a control stream, the method comprising the steps of:

(a) combining carbon dioxide with a pressurized first carrier stream to form a first mixed stream;

(b) introducing a chlorination agent into the control stream, the chlorination agent increasing the concentration of hypochlorous acid and hypochlorite of the control stream;

10 (c) combining the first mixed stream with the control stream having the chlorination agent, thereby reducing the pH of the control stream and increasing the relative ratio of hypochlorous acid to hypochlorite of the control stream.

13. The method of Claim 12, further including the step of releasing carbon dioxide from the first mixed stream into control stream to form carbonic acid therein.

14. The method of Claim 12, wherein the carbon dioxide is over approximately 55 psi.

15. The method of Claim 12, wherein the first carrier stream is over approximately 10 psi.

16. The method of Claim 12, wherein the carbon dioxide is at a first pressure, wherein the first carrier steam is at a second pressure and comprises water, wherein the first mixed stream is a carbon dioxide-water solution at a third pressure, wherein the control stream prior to introducing the chlorination agent has a fourth pressure and a first pH, and wherein the first, second and third pressures are each at least approximately 50 psi greater than the fourth pressure.

17. The method according to Claim 16, wherein the first pressure is between about 55 psi and 75 psi and the second pressure is greater than about 10 psi.

18. The method according to Claim 16, wherein the chlorination agent is selected from the group comprising: chlorine gas, a solid hypochlorite salt, and a liquid hypochlorite solution.

19. A system for producing a hypochlorous acid solution comprising:

(a) a pressurized source of carrier liquid;

(b) a chlorination source in fluid communication with the pressurized carrier liquid, wherein the chlorination source is disposed to introduce a quantity of chlorinating agent into a
5 quantity of the carrier liquid;

(c) an acid source in fluid communication with the pressurized carrier liquid, wherein the acid source is disposed to introduce a quantity of acid into a quantity of the chlorinating agent containing carrier liquid and wherein the acid is not carbonic acid; and

(d) a holding tank, wherein the quantity of acid is combined with the chlorinating
10 agent containing carrier liquid in an amount sufficient to maintain a pH wherein the ratio of hypochlorous acid to hypochlorite ion is greater than one.

20. The system of Claim 19, wherein the resulting hypochlorous acid solution is about 77 to about 99 percent hypochlorous acid.

Approved for Release by NSA on 09-08-2013 pursuant to E.O. 13526